NON-PUBLIC?: N
ACCESSION #: 8812060010
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Braidwood Unit 2 PAGE: 1
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DOCKET NUMBER: 05000457

TITLE: Reactor Trip Due to Negative Rate Strip as a Result of Rod Control System Loss of Power
EVENT DATE: 11/05/88 LER #: 88-031-00 REPORT DATE: 11/18/88

OPERATING MODE: 1 POWER LEVEL: 088

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: C. Wiegand, Technical Staff Engineer TELEPHONE: (815) 458-2801 ext. 2492

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE TO NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

At 1307 on November 5, 1988 during Rod Control (RD) System troubleshooting, the 2B Motor Generator (M/G) set's IRV A relay (which was oscillating) was isolated to replace a blown fuse. This resulted in a loss of excitation to the 2B M/G set and the 2A M/G set was demanded to carry the entire RD System Load. The 2A M/G set's overvoltage relay (1H) was picked up, resulting in a total loss of power to the RD system. At 1308 a reactor trip due to a negative rate trip on all Nuclear Instrumentation System power range channels occurred. The cause of this event is an incorrect 1H relay setting due to conflicting information in the Technical Manual. The immediate corrective actions taken were to reset the IH relay, replace the blown fuse, and to simulate the identical conditions that led to the trip (verifying that the incorrect relay setting was the cause), The 1H relays for each M/G set of both units have been verified at the correct setpoints. All future relay settings will be given by M/G output voltage. Testing of the M/G set setpoints will be performed during each refueling outage. There have been previous occurrences of Rod Control System

perturbations that resulted in a reactor trip. Previous corrective actions are not applicable to this event.

END OF ABSTRACT

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: Braidwood 2; Event Date: November 5, 1988; Event Time: 1308;
Mode: 1 - Power Operation; Rx Power: 88%;

RCS AB! Temperature/Pressure: 582 degrees F/2242 psig

B. DESCRIPTION OF EVENT:

There were no structures, systems, or components inoperable at the beginning of the event that contributed to the event.

At 1307 on November 5, 1988 Braidwood Station Unit 2 was in Mode 1 operating at approximately 88% power. During normal operating rounds it was observed that the Rod Control Systems (RD) (AA) 2B M/G set IRV A directional current relay's moving contact was oscillating between the stationary contacts. A Nuclear Work Request (WR) was written to troubleshoot the oscillating contact; troubleshooting was in progress at 1307. The Operational Analysis Department (OAD) was performing troubleshooting on the 2B M/G set and discovered a blown fuse (22FU). Subsequent discussions between OAD and licensed operators on duty resulted in the decision to isolate the IRV A relay when replacing the fuse. This would prevent a voltage spike which could potentially trip the 2B M/G set offline. At the time, isolating the IRV A relay was considered to be the most conservative method because it did not involve taking the 2B M/G set offline. At 1308 the IRV A relay was isolated which caused the 2R relay to dropout opening up the contacts, causing a loss of excitation current to the voltage regulator. With a loss of excitation current, the 2B M/G set could not carry any load, therefore, the 2A M/G set was demanded to carry the entire Rod Control System load. Upon assuming the entire system load, the 2A M/G set's exciter current rose to a point such that overvoltage relay (1H) was picked up, resulting in the 2A M/G set's output breaker opening. Although the 1H relay is called an overvoltage relay it really senses exciter current. The opening of the breaker resulted in a total loss of power to the Rod Control System which resulted in the release of all 53 Rod Control Cluster Assemblies (RCCA's). The release of all RCCA's resulted in an automatic reactor trip due to a negative rate trip on all four of the Nuclear Instrumentation System (NIS) (IG) power range channels.

The licensed operators on duty performed a safe shutdown following station

procedures, and stable conditions were achieved by 1330.

Although a potential problem with the 2B M/G set was being investigated, the 2B M/G set itself was operable and was sharing half of the Rod Control System Load with the 2A M/G set, However, the troubleshooting of the 2B M/G set did contribute to the initial cause of the event.

The appropriate NRC notification via the ENS phone system was made at 1456 pursuant to 10CFR50.73(b)(2)(ii).

This event is being reported pursuant to s10CFR50.73(a)(2)(iv) - any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature, including the reactor protection system.

C. CAUSE OF EVENT:

Each of the M/G sets is designed to be capable of carrying the entire Rod Control System load by itself. The cause of this event is the failure of the 2A M/G set to carry the entire Rod Control System load. Subsequent investigations by OAD discovered that the 1H relay, which provides overvoltage protection, was set at a conservatively low value. The normal operating voltage of the M/G sets are 260 volts plus or minus 5 volts. The relay was set to pick up at approximately 260 volts. Consequently, a very small voltage rise was enough to trip the 2A M/G set offline. The intermediate cause of this event was an incorrectly set overvoltage relay. The root cause of this event is conflicting information, regarding the setting of this relay, reported in the Technical Manual governing the M/G sets (2702/386 book 4; Westinghouse Shop Order 82-S-988). One section of the manual indicates a setting of 3.0 amps for the pickup of the 1H relay. Another section of the manual indicates that the setting should be for 280 volts. Unfortunately, 3.0 amps does not convert to 280 volts, rather, 3.0 amps develops to a voltage setting of approximately 260 volts. The 2A M/G set overvoltage relay was checked by OAD and was found set at 3.05 amps, the setting for 280 volts was determined to be 3.65 amps.

D. SAFETY ANALYSIS:

This event had no effect on the safety of the plant or the public. All systems operated as designed. There would not have been any safety consequences if this event had occurred under more severe conditions. The worst case conditions would be the Unit operating at 100% power; the plant response would have been the same.

E. CORRECTIVE ACTIONS:

The immediate corrective actions taken were to reset the 2A M/G set overvoltage relay (1H) such that it would pickup at the correct value of 280 volts, replace the blown fuse that was found in the 2B M/G set circuitry, and to simulate the identical conditions which led to the trip. The simulations involved recreating the conditions to verify that the M/G set with a correct overvoltage setting would be able to carry the Rod Control System load. The resulting trials showed that the incorrect relay setting was the cause of the reactor trip. The overvoltage relays for each M/G set of both units have been rechecked and are at the correct setpoints.

Actions to prevent recurrence include having Production Services Department to validate that all future relay setting orders for these relays be given by M/G output voltage. This will be tracked to completion by Action Item 457-200-88-78501. Station Technical Staff will ensure that testing of the M/G set setpoints is performed during each refueling outage. This will be tracked to completion by Action Item 457-200-88-18502.

F. PREVIOUS OCCURRENCES:

There have been previous occurrences of Rod Control System perturbations that resulted in a reactor trip. The corrective actions were implemented addressing both root and contributing causes. Previous corrective actions are not applicable to this event.

G. COMPONENT FAILURE DATA:

This event was not the result of component failure, nor did any components fail as a result of this event.

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Commonwealth Edison
Braidwood Nuclear Power Station
Route 1, Box 84
Braceville, Illinois 60407
Telephone 815/458-2801

November 28, 1988
B W/88-1482

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Dear Sir:

The enclosed Licensee Event Report from Braidwood Generating Station is being transmitted to you in accordance with the requirements of 10CFR50.73(a)(2)(iv) which require a 30 day written report.

This report is number 88-031-00; Docket No. 50-457.

Very truly yours,

R. E. Querio
Station Manager
Braidwood Nuclear Station

REQ/AJS/jab
(7126z)

Enclosure: Licensee Event Report No. 88-031-00

cc: NRC Region III Administrator
NRC Resident Inspector
INPO Record Center
CECo Distribution List

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